

Specification

PROJECT FILE NO. 021052

Backhoe Modifications – Hydraulic Line Replacement for the OU 7-10 Glovebox Excavator Method Project

Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho



Form 412.14
07/24/2001
Rev. 03

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| Specification | BACKHOE MODIFICATIONS – HYDRAULIC LINE REPLACEMENT FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT | Identifier: SPC-401 |
| Environmental | | Revision: 0 |
| Restoration | | Page: iii of viii |
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ACRONYMS

| | |
|-------|---|
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society of Testing and Materials |
| INEEL | Idaho National Engineering and Environmental Laboratory |
| OSHA | Occupational Safety and Health Administration |
| OU | operable unit |
| RCS | Retrieval Confinement Structure |
| SAE | Society of Automotive Engineers |

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1. SUMMARY

1.1 General

The Idaho National Engineering and Environmental Laboratory (INEEL), a U.S Department of Energy national laboratory operated by Bechtel BWXT Idaho, LLC, will procure a backhoe excavation system. The backhoe excavation system incorporates a modified CAT 446B backhoe loader and associated end effectors. The backhoe loader will be the primary instrument used in the retrieval of radioactively contaminated waste in the Operable Unit (OU) 7-10 Glovebox Excavator Method Project.

This project incorporates a Retrieval Confinement Structure (RCS) located over the excavation site. The RCS consists of a steel-framed, steel-paneled structure with Lexan windows. The RCS is located within a larger fabric-skinned Weather Enclosure Structure. Packaging Glovebox Systems are attached directly to the confinement structure and are fed by track-guided transfer carts.

A standard CAT 446B backhoe will perform soil excavation, probe removal, 55-gal drum removal (using a JAW bucket design), and core sampling. As shown in Figure 1, the backhoe cab and loader are located outside the RCS while the boom, stick, and various end effectors are located inside the RCS (contaminated side).

The environment within the RCS is highly aggressive. Carbon tetrachloride at a concentration up to 1,000 ppm is estimated within the RCS during waste excavation. Carbon tetrachloride will condense on the backhoe boom, stick, and end effectors attacking susceptible materials. The standard flexible hydraulic lines, attached to the boom and stick, are constructed of materials that are susceptible to attack within the RCS environment. To negate hydraulic line failure within the RCS, during waste excavation, all of the hydraulic lines within the RCS shall be replaced with Parker hydraulic lines comprised of fluorinated elastomers and rated for a working pressure of 4,000 lb. Teflon hydraulic hoses (comprised of polytetrafluoroethylene [C₂F₄]) shall replace all hydraulic hoses leading to and from the boom cylinder, stick cylinder, stick extension cylinder, bucket cylinder, and boom pivot cylinders as shown on contract Drawing 519931, "OU 7-10 Glovebox Excavator Method Project Excavator Modifications WSE (Western States Equipment) Modifications." Additionally, the Teflon hydraulic hoses shall be used for the shared hydraulic hoses leading to and from the quick disconnects for the JAW bucket and hydraulic hammer, the whip hoses for the JAW bucket and hydraulic hammer, and the hydraulic coupler cylinder hose as shown on contract Drawing 519931.

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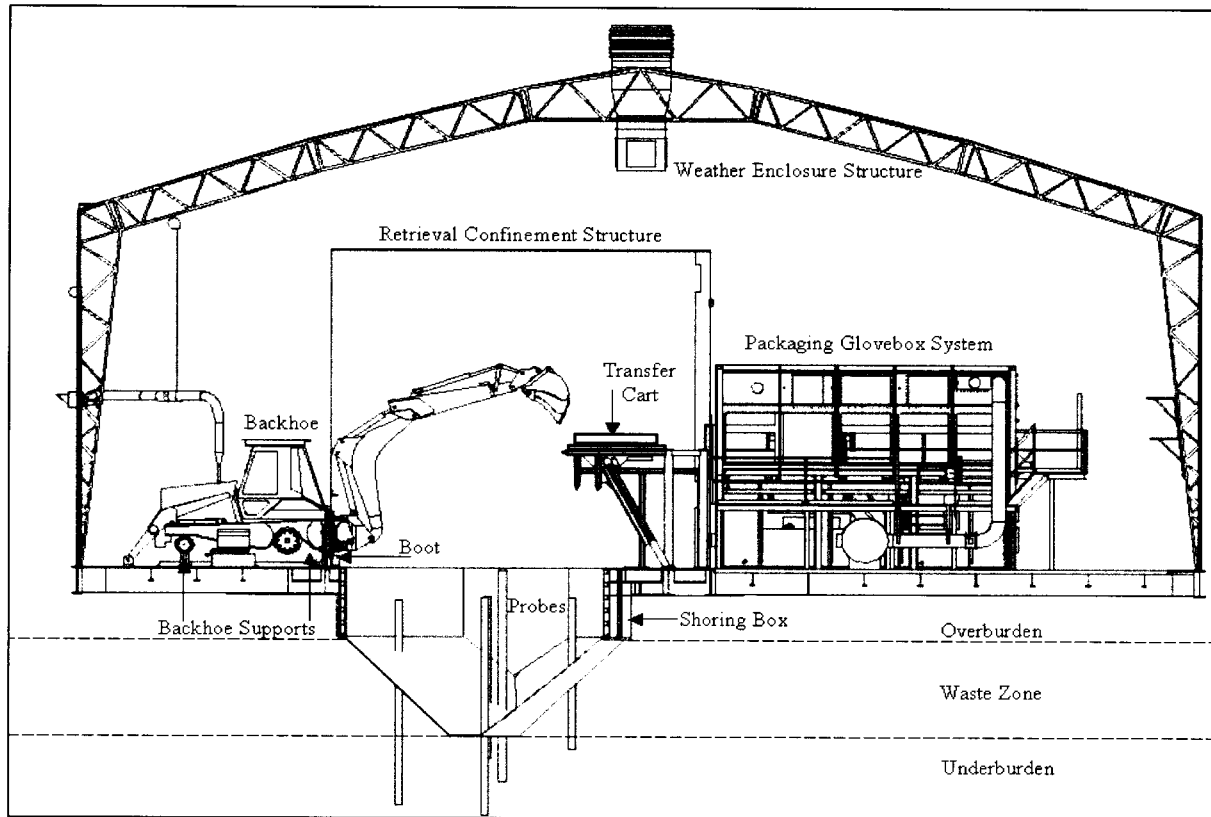


Figure 1. Cross section of the OU 7-10 Glovebox Excavator Method Project Facility.

Before installation, all of the hoses located within the RCS structure will be pressure tested at design pressure to ensure integrity during waste excavation.

1.2 Work Included

This specification covers the requirements of the subcontractor and equipment supplier for the design, fabrication, assembly, installation, and testing of the Parker Teflon hydraulic hoses to and from the CAT 446B boom cylinder, stick cylinder, stick extension cylinder, bucket cylinder, boom pivot cylinders, hydraulic coupler cylinder, quick disconnects for the JAW bucket and hydraulic hammer, JAW bucket whip hoses, and hydraulic hammer whip hoses. It is not the intent of this specification to completely define all details of installation. Equipment shall be designed, fabricated, assembled, and installed in accordance with this specification and the standard practices of equipment suppliers and subcontractor standard practices when such practices do not conflict with this specification.

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Teflon hydraulic hoses and all associated hardware shall be completely assembled and installed on the CAT 446B backhoe at the subcontractor facility, including the boom cylinder, stick cylinder, stick extension cylinder, bucket cylinder, boom pivot cylinders, hydraulic coupler cylinder, quick disconnects for the JAW bucket and hydraulic hammer, JAW bucket whip hoses, and hydraulic hammer whip hoses.

The following shall be delivered to the INEEL:

1. Teflon hydraulic hoses, installed on the CAT 446B backhoe, starting at the backhoe inner boot (vertical plate welded to the inner frame between the backhoe valve body and the large frame opening from which the hydraulic hoses exit the frame) and encompassing the entire boom assembly, stick assembly, and end effectors as shown on contract Drawing 519931.
2. Vendor data submittals in accordance with vendor data schedule and this specification.

1.3 Work Not Included

None identified.

1.4 INEEL-Furnished Materials, Equipment, and Services

The INEEL will furnish the CAT 446B backhoe loader.

2. APPLICABLE CODES, PROCEDURES, AND REFERENCES

The following documents form a part of this specification to the extent specified herein and as applicable. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In case of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

2.1 National and Local Codes

Occupational Safety and Health Administration

29 CFR 1910, Occupational Safety and Health Standards

2.2 Industry Standards and U.S. Department of Energy Orders

American Institute of Steel Construction, LRFD Manual of Steel Construction

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American Society of Mechanical Engineers , ASME Boiler and Pressure Vessel
Code, Section V

American Society of Testing and Materials (ASTM)

ASTM A36, Standard Specification for Carbon Structural Steel

ASTM A570, Standard Specification for Steel, Sheet and Strip, Carbon,
Hot-Rolled

ASTM A325, Standard Specification for Structural Bolts, Steel, Heat
Treated 120/105 ksi Minimum Tensile Strength

Society of Automotive Engineers (SAE)

SAE J31, Hydraulic Backhoe Lift Capacity

SAE J1097, Hydraulic Excavator Lift Capacity Calculation and Test
Procedure

SAE J1179, Hydraulic Excavator and Backhoe Digging Forces, (This
specification is provided for reference only. It is not a requirement)

2.3 Military (National) Specification

Not applicable.

2.4 Related Specifications

Not applicable.

2.5 References

Not applicable.

3. TECHNICAL REQUIREMENTS

3.1 General

The hydraulic lines shall be sized and modified by the equipment supplier to provide for a fully functional system and to perform as specified in a safe and efficient manner. This section defines the design requirements for the Teflon hydraulic hose replacement to and from the boom cylinder, stick cylinder, stick extension cylinder, bucket cylinder, boom pivot cylinders, hydraulic coupler

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cylinder, quick disconnects on the JAW bucket and hydraulic hammer, and JAW bucket and hydraulic hammer to the quick disconnects (whip hoses).

3.2 Restrictions

None identified.

3.3 Performance Requirements

All hydraulic hoses shall be tested at design pressure before installation onto the CAT 446B backhoe.

All hydraulic lines shall be capable of delivering the proper flow of hydraulic fluid to each destination at the appropriate pressure.

3.4 Software

Not applicable.

3.5 Registered Professional Engineer Certification

Not applicable.

3.6 Human Factors

Not applicable.

3.7 Reliability and Maintainability

3.7.1 Reliability

All Teflon hydraulic hose fittings and connections shall be of a quality that the expected mean time between failures for this system shall not be less than 1,080 hours.

The hydraulic hose assembly shall employ rugged, industrial, off-the-shelf equipment to the maximum extent practicable.

3.7.2 Maintainability

The hydraulic hose assembly shall maintain the original CAT 446B hydraulic hose configuration to facilitate ease of inspecting, servicing, and maintaining equipment to the extent possible.

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Standard replacement parts for the hydraulic hose assembly, as shown on manufacturer's recommendations, shall be readily available for routine maintenance activities

3.8 Environmental Regulatory Requirements and/or Site and Operating Requirements

Not applicable.

3.9 Natural Phenomena Requirements

Not applicable.

4. ENVIRONMENTAL, SAFETY, AND HEALTH REQUIREMENTS

4.1 Subcontractor Safety

The subcontractor shall work in accordance with applicable Occupational Safety and Health Administration requirements as stated in 29 CFR 1910.

4.2 Personal Protective Equipment

The subcontractor shall determine and require use of appropriate personal protective equipment for all tasks performed.

4.3 Emergency Response

Not applicable.

4.4 Accident Investigation

Not applicable.

5. MANUFACTURING AND ASSEMBLY

5.1 General

The hydraulic hose assembly shall be assembled and installed on a CAT 446B backhoe in the subcontractor's shop to ensure proper fit and operation. The technical representative for the contractor (or alternate) will inspect the assembled final product. Assembly of the equipment shall be made in a clean, dust-free area of the subcontractor facility.

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5.2 Prohibitions

None identified.

5.3 Material

Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in standard commercial practices of the equipment manufacturer. Materials shall be as delineated on contract drawings.

5.4 Fabrication

Not applicable.

5.5 Equipment Tagging

Not applicable.

5.6 Cleaning, Painting, and Coating

All hydraulic hose assemblies shall be thoroughly cleaned. All scale, oxides, lubricants, chips, and other foreign matter shall be removed.

5.7 Spare Parts

Applicable standard quality requirements identified in the procurement package shall be cross-referenced.

5.8 Other Processes

Not applicable.

6. SUBMITTALS

As a minimum, the subcontractor shall provide the contractor with the submittals referenced in this section. The subcontractor shall be responsible for all submittals that come from the equipment supplier. Additional submittal requirements are defined in the vendor data schedule and applicable contract documents. The quantities and submittal schedule are included in the attached vendor data schedule.

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6.1 General Submittal Requirements

6.1.1 General Procedures

Vendor data, whether prepared by the subcontractor or subcontractor's subtier or supplier, shall be submitted as instruments of the subcontractor. Therefore, before submittal, the subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the submittal itself, meet all the requirements of the subcontract specifications, drawings, or other contract documents.

Each submittal shall contain identification for each separable and separate piece of material or equipment, and literature with respect to the information provided in the specification and on the vendor data schedule. Submittals shall be numbered consecutively for each different submittal.

6.1.2 Vendor Data Schedule

Vendor data required by the specification sections are identified on the vendor data schedule. The vendor data schedule provides a tabular listing by item number, drawing or specification reference, and description of the item or service. The type of submittal is identified by a vendor-data code, and the time required to submit the item is identified by a when-to-submit code. An approval code specifies whether the submittal is for mandatory approval or for information only. One copy of routine paper or electronic file submittals is required. Additional copies may be required by the vendor data schedule. Electronic file submittals are preferred.

6.1.3 Vendor Data Transmittal and Disposition Form 431.13, "Construction Vendor Data Transmittal & Disposition Form."

All vendor data shall be submitted to the contractor using the Form 431.13. The form provides a method for the subcontractor to submit vendor data and provides a means for the contractor to disposition the submittal. The subcontractor shall list the vendor data schedule item number, a vendor data transmittal tracking number (if applicable), the drawing or specification number reference, a tag number (if applicable), the submittal status (e.g., mandatory approval, information only, or resubmittal), the revision level, and the item description. The description should be complete enough that a person unfamiliar with the project can determine what the submittal includes.

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6.1.4 Disposition by the Contractor

Comments from the contractor and required action by the subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

- A. **Work May Proceed:** Submittals so noted will generally be classed as data that appear to be satisfactory without corrections.
- B. **Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit Entire Submittal:** This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the contractor before construction.
- C. **Work May NOT Proceed. Revise and Resubmit:** Submittals so dispositioned will require a corrected resubmittal for one of the following reasons:
 - (1) Submittal requires corrections shown on comments before final review
 - (2) Submittal data incomplete and requires more detailed information before final review
 - (3) Submittal data does not meet subcontract document requirements.
- D. **Accepted for Use. Information Only Submittal:** Submittals so dispositioned will generally be classified as information only for as-specified material and equipment.

Mandatory approval coded vendor data will be reviewed by the contractor and receive an A, B, or C disposition. Information only submittals without comments will receive a D disposition. A, B, and C coded dispositioned submittals will be returned to the subcontractor. D dispositioned submittals will not be returned to the subcontractor. The Contractor may provide internal review of information only submittals. In the event that comments are generated on an information-only submittal, the submittal may be dispositioned B or C and returned to the subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the subcontractor will not be required.

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The contractor will return dispositioned submittals with reasonable promptness. The subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

6.2 Spare Parts and Special Tools List

Not applicable.

6.3 Operations and Maintenance Manuals

The operations and maintenance manual shall cover the installation, operation, and maintenance of the equipment in detail. All drawings, diagrams, and record forms required for the installation shall be included and incorporated in the manual.

6.4 Drawings

Not applicable.

6.5 Software

Not applicable.

6.6 Inspection Test Plans, Procedures, Reports

Inspection of test plans, procedures, and reports includes the following:

Performance test procedures (subcontractor preshipment): Performance test procedures and reports as outlined in Section 7.4.1 of this specification.

Performance test reports (subcontractor preshipment): Performance test results and reports as outlined in Section 7.4.2 of this specification.

7. QUALITY ASSURANCE

7.1 Minimum Qualifications of Manufacturer, Supplier, or Personnel

The hydraulic hoses shall be assembled and installed by a firm that has prior related experience pertaining to the installation of hydraulic hoses along the boom, stick, and end effectors of a CAT 446B backhoe.

The hydraulic hoses shall be tested at design pressures by a firm that has prior related experience pertaining to the pressure testing of hydraulic hoses.

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All replacement hoses shall have pressure ratings at or above the hoses they replace.

7.2 QA Program

The manufacturer is responsible for providing materials and workmanship that meets the codes and standards identified in this specification.

7.3 Nondestructive Examination

Not applicable.

7.4 Operational Testing

7.4.1 Performance Test Procedures (Subcontractor Preshipment)

The equipment supplier or subcontractor shall submit to the contractor an in-shop testing plan and procedure before demonstration of a full hydraulic function test at the facility of the equipment supplier or subcontractor. The plan and procedure shall include the date, test conditions, duration of testing, testing sequence, materials used, and methods of performing the tests.

The subcontractor shall inform the contractor 1 week in advance of performance testing so that a contractor representative may be present during the testing process.

Subcontractor testing should demonstrate that all hydraulic lines operate within standard and elevated parameters as defined within this specification.

Testing acceptance criteria:

- Test uninstalled hydraulic hose and fitting integrity at design pressures.
- Test installed hose integrity during full hydraulic pressure demonstration. No damage or leakage allowed.
- Boom, stick, and bucket shall be operated at full strokes.

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7.4.2 Performance Test Report (Subcontractor Preshipment)

The equipment supplier or subcontractor shall submit to the contractor the in-shop testing results following the demonstration of hydraulic hose integrity at the facility of the equipment Supplier or subcontractor.

7.5 Special Processes

Not applicable.

8. PACKAGING AND SHIPPING

8.1 Packing and Packaging

Not applicable.

8.2 Marking and Handling

Not applicable.

8.3 Special Transportation Requirements

Not applicable.

9. EXECUTION

9.1 Installation

The Teflon hydraulic hose assembly shall be installed on the CAT 446B backhoe at the subcontractor's facility.

9.2 Startup and Calibration

Not applicable.

9.3 Training

Not applicable.

9.4 Maintenance

The hydraulic hose assembly manufacturers shall provide recommended maintenance instructions for all hydraulic hoses and all associated equipment.

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10. MARKING AND IDENTIFICATION

Not applicable.

11. ACCEPTANCE

11.1 Final Acceptance Method

Successful performance of the test results and submittal of all documents listed on the vendor data schedule will constitute acceptance.

11.2 Inspection and Hold Points

Unless otherwise specified by the purchase order, the supplier shall notify the contractor at least 5 working days in advance of the time that the hydraulic lines will be available for source inspection by the contractor representative. Work cannot proceed without written authorization from the contractor after hold point inspection.

11.3 INEEL Surveillance and Audits

The authorized contractor representative may perform source inspection or surveillance.

12. ATTACHMENTS

Vendor Data Schedule- Form 431.14

Contractor Drawing 519931, "OU 7-10 Glovebox Excavator Method Project Excavator Modifications WSE (Western States Equipment) Modifications."

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ATTACHMENT

431.14
08/01/2001
Rev. 03

Vendor Data Schedule

Project Title OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT - BACKHOE
MODIFICAITON - HYDRAULIC LINE REPLACEMENT **Project No.** 021052 -
22001

System Engineer/Project Manager LOPEZ DARYL A **Date:** 12-APR-02 **Rev:** 0

Vendor Data Coordinator Address STURM BETH L, WCB-3WH502, MS: 3535

| Vendor Data Codes | | | | |
|---|--|--|---|--|
| A. As-Built Drawings B. Assembly Drawings C. Attendance Record D. Blasting Plan E. Catalog Data F. Chem & Physical Analysis G. Concrete Mix Design H. Control System Diagram I. Design Calculations J. Installation Instructions | K. Manufacturers Data Report L. O&M Manual M. Parts List N. Piping Drawing O. Procedure/Instructions P. Pump Head Curves Q. Personnel Qualifications R. Red_line Drawings S. RSMI & Maintenance Log T. Sample(Color, Texture, etc.) | U. Shop Drawings V. Survey Records W. Test Procedure X. Special Processes Y. Operational/CC Testing Z. Test Reports AA. UL/FM Listing AB. Warranty/Guarantee AC. Weld Records AD. Wiring Diagrams | AE. MSDS AF. Hardware Schedule AG. Specification AH. Manufacturing/Inspection/Test Plan AI. Test Certification AJ. Recommended Spares AK. Special Tools List AL. Certificate of Conformance AM. Certificate of Disposal or Destruction AN. Design Verification | AO. Design Qualification Testing AP. Traceability Procedure AQ. Cleaning Procedure AR. Weld Procedure Qualification AS. Welder Performance Personnel Qualifications AT. Non-Destructive Examination Personnel Certifications AU. Inspector Certifications AV. Limited Shelf Life/Operational Data AW. Special Packaging, Shipping, and Rigging Procedure AX. Certificate of Materials to ASME Code AY. Chemical Inventory AZ. Other |
| When to Submit | | | | |
| AC - As Completed AT - After Test BC - Before Contract Awarded | BFA - Before Final Acceptance BFR - Before Fabrication Release ROS - Removed Off-Site PDS - Prior to Delivery on site | PTP - Prior to Purchase PS - Prior to Shipment PT - Prior to Test | PTC - Prior to Construction Start PTI - Prior to Installation PTW - Prior to Welding | TS - Time of Shipment WP - With Proposal |

| | | |
|---------------|---|---------------------|
| Specification | BACKHOE MODIFICATIONS – HYDRAULIC LINE REPLACEMENT FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT | Identifier: SPC-401 |
| Environmental | | Revision: 0 |
| Restoration | | Page: A2 of A2 |

ATTACHMENT

| Item No. | Clause/Article or Drawing/Specification Reference | Description | Vendor Data Code | Extra Copies Required | When to Submit | Approval Code |
|----------|---|-------------|-------------------|-----------------------|------------------------|-------------------|
| | 7.4.1 | | W. Test Procedure | 4 | PT - Prior to Test | Approval Required |
| | 7.4.2 | | Z. Test Reports | 4 | AT - After Test | Approval Required |
| | 6.3 | | L. O&M Manual | 4 | PS - Prior to Shipment | Information Only |

Instructions: 1. Refer to subcontract documents for instructions on submittals.
2. Electronic submittals in lieu of paper documents are acceptable and encouraged.
3. The normal number of copies required is ONE. If more are required, the number will be shown here.
4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.